

Goodenia effusa (Goodeniaceae), a new species from north Queensland, Australia

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Abstract

Goodenia effusa is described as new. It is an annual herb from north Queensland with morphological affinity to *G. virgata*, *G. armitiana* and *G. triodiophila*. A diagnostic table of morphological differences is provided, along with illustrations and a distribution map of this new species.

Introduction

Goodenia R.Br. is a genus of approximately 190 species, nearly all of which are endemic to Australia (AVH 2015). Since the 'Flora of Australia' account dealing with 179 species (Carolin 1992), many new species have been discovered and described, principally from northern and western Australia (Cranfield and Sage 1997; Sage 2000, 2001; Albrecht 2002; Holland and Boyle 2002; Sage and Dixon 2005; Cowie 2005; Sage and Albrecht 2006; Sage and Kelly 2007; Lang 2008). In Queensland, numerous new collections have recently become available from previously poorly collected areas in the north. Among these collections, a previously undescribed species was discovered from north Queensland pastoral districts of Cook and Burke (as defined by Anonymous 1975) in the IBRA regions of Einasleigh Uplands and Gulf Plains (IBRA7 2012) (Fig. 3). This new species belongs in *Goodenia* subgenus *Goodenia*, section *Goodenia*, subsection *Ebracteolatae* K.Krause (Carolin 1992) and is morphologically similar to *G. virgata* Carolin, from central Australia. It is also similar to *G. armitiana* F.Muell., which occurs in the same area and *G. effusa*, and to *G. triodiophila* Carolin which usually occurs further west around Mt Isa but the distribution overlaps at Croydon (AVH 2015).

Terms for corolla parts used by Carolin (1992) include 'abaxial lobes' (the three shorter or fan lobes) and 'adaxial lobes' (the two longer lobes) which often have a distinctive auricle on one side. These auricles on the adaxial lobes sometimes overlap to cover the indusium in early flowering (Fig. 2).

Goodenia effusa A.E.Holland *sp. nov.*

Diagnosis: *Goodenia effusa* A.E.Holland differs from *Goodenia virgata* Carolin by the terete basal leaves, and the usually larger corolla (12–16 mm). It differs from *Goodenia armitiana* F.Muell. and *Goodenia triodiophila* Carolin by the plants drying black and the corolla lobe wings tapered to lobe apex.

Type: Queensland: Cook District: Flat Creek, c. 50 km south of Georgetown, *M.T. Mathieson 1094*, 23 May 2011 (holo: BRI-AQ831527, iso: DNA).

A diffuse annual herb to 40 cm tall, with numerous erect, ascending and/or straggling stems, the whole plant drying black. Stems slender, to 1 mm diam., striate, glabrous, occasionally with small tufts of cottony hairs in basal axils, not viscid. *Leaves* all similar (basal and cauline), ascending and often curving, slender, terete, 10–70 mm long, 0.3–0.5(–1) mm diameter; apex acute and slightly reflexed, glabrous. *Inflorescences* racemes to 15 cm long, or subumbels (reduced racemes), 2–5(–15)-flowered. Bracts subtending flowers similar to leaves, reducing distally. Pedicels slender, ascending and curving upwards, 8–35 mm long, longer or shorter than the subtending bract, articulated c. 1 mm below ovary, glabrous or with a few scattered glandular or simple hairs towards apex, persisting after capsule has fallen. Bracteoles absent. *Calyx* 3–5.5 mm long, sparsely to moderately hairy with short spreading simple hairs and/or glandular hairs; sepals adnate to ovary in lower half, lobes subequal, narrowly ovate, 2–4 mm long, 0.4–0.8 mm wide, acute. *Corolla* 12–16 mm long, yellow, with veins brown; outer surface sparsely to moderately hairy with a mixture of short spreading simple hairs and glandular hairs; inner surface hairy in lower half with hairs retrorse, simple, without enations; anterior pouch prominent, c. 2 mm long, equal to or shorter than the ovary; abaxial lobes 1.5–3 mm long, acute or obtuse, with 5 prominent veins; lobe wings 1–2 mm wide, attached to upper two thirds to three quarters of lobe and extending well beyond lobe to form an acute angle with the lobe apex, margin of wing entire or somewhat erose, apex of wing acute to obtuse; adaxial lobes 4–8 mm long, otherwise similar to abaxial lobes; with wings 1.5–2.5 mm long, 1–2 mm wide and merged with the auricle on one side; auricles c. 2.5 mm long and slightly wider than wing, sometimes speckled. *Staminal filaments* 2–3 mm long; anthers 1–1.5 mm long, with minute processes at tip. *Ovary* 2–3 mm long, not ribbed, rounded at base, moderately hairy with short stiff spreading hairs sometimes mixed with glandular hairs; septum less than one quarter of ovary length; ovules 6–8; style somewhat flattened, 4–6 mm long, glabrous or with a few scattered hairs to 0.3 mm long; indusium depressed oblong, slightly folded inwards, 1–1.5 mm long, 1.5–2 mm wide, densely hairy with multicellular white or translucent hairs at base, many of these equalling the indusium length; bristles on lips to 1 mm long, white. *Capsule* globose to somewhat longitudinally flattened, 4–6 mm long, 3.5–6 mm wide, rounded or slightly tapered at each end, 2-valved, with valves dehiscent longitudinally to base; seeds 6–8, suborbicular, colliculate, brown, 3–5.5 mm diam. including c. 1 mm wide wing. Figs 1, 2.

Additional specimens examined: Queensland: Burke: 9.7 km from Croydon on the Croydon to Normanton road, K.R. McDonald 2247 & J.A. Covacevich, 30 Apr 2004 (BRI). Cook: 32.1 km along Bulimba road from the junction with Burke Development road, K.R. McDonald 2360 & J.A. Covacevich, 3 May 2004 (BRI); 14.5 km along Blackdown Station road, off the Chillagoe to Wrotham Park road, P.I. Forster 24350 & R. Booth, 11 May 1999 (BRI); East of Dimbulah, edge of township, K.R. McDonald 8834, 24 Mar 2010 (BRI); Near Petford on Irvinebank road, K.R. McDonald 6184 & A. Sellers, 15 Mar 2007 (BRI, DNA); 1 km SW of Lappa Junction on S side of railway, P.I. Forster 30744 & K.R. McDonald, 12 Apr 2005 (BRI); Near 'Hindu Corner', 4.8 km from Petford, D.E. Symon 4876, 23 May 1967 (AD, BRI, CANB); 17.2 km by road W of Irvinebank towards Petford, K.R. McDonald 6174 & A. Sellers 15 Mar 2007 (BRI); 22.7 km along Abingdon Downs road from Gulf Development road, K.R. McDonald 6194, 16 Mar 2007 (BRI); 10.5 km along Richmond road from junction with Croydon – Normanton road, K.R. McDonald 2238 & J.A. Covacevich, 29 Apr 2004 (BRI); 2 km from Einasleigh along the Einasleigh to Forsayth road, K.R. McDonald 2559, 22 May 2004 (BRI); 4.5 km S along track off Gregory Development road just W of Einasleigh River near Carpentaria Downs, E.P. Addicott 67 & M.R. Newton, 22 Apr 1999 (BRI, CNS); 73.6 km by road N of the Gilberton turnoff, K.R. McDonald 5508, 22 July 2006 (BRI); c. 245 km N of Hughenden on the road to the Lynd, S.W. Jacobs 9917, 9 Jun 2008 (BRI, CANB, NSW); 9.2 km by road from Ortona Station boundary towards Agate Creek, Gilbert River Holding, K.R. McDonald 6970, 12 Oct 2007 (BRI); Gilbert River Station, 3.4 km by road from Robin Hood Station boundary gate, K.R. McDonald 5445 & J.A. Covacevich, 23 July 2006 (BRI); Gilbert River Holding, 2.6 km along the road from boundary with Robin Hood Station, K.R. McDonald 15500, 19 Apr 2014 (BRI); c. 14.5 km S of The Lynd road junction on the road to Hughenden, J.R. Clarkson 183, 15 May 1975 (BRI, CANB).

Distribution and Habitat: *Goodenia effusa* is confined to northern Queensland, between Chillagoe in the north and the Lynd junction in the south, and between Croydon in the west and Dimbulah in the east (an area locally known as the northern goldfields). It occurs in open woodland of *Eucalyptus cullenii*, *E. whitei* or *E. melanophloia*, sometimes with *Melaleuca* spp. with grassy or shrub understorey, on ridges, low hills and flats, in sandy soil, sandy clay or stony soil. It also occurs in disturbed areas on roadsides. Fig. 3.

Etymology: The species epithet refers to the many-stemmed diffuse habit.

Flowering: *Goodenia effusa* flowers mainly in the wet season in March, April and May, and occasionally at other times (June, July, August, October) probably in response to rain.

Conservation: *Goodenia effusa* occurs across a wide geographical range, and is variously described on the specimen label notes as common or occasional. It is therefore not considered to be threatened at present.

Affinities: The morphological differences and similarities between *G. effusa*, *G. virgata*, *G. armitiana* and *G. triodiophila* are listed in Table 1. *Goodenia virgata* is most easily distinguished from *G. effusa* by the flat basal leaves 1–4 mm wide (terete and 0.3–0.5(–1) mm wide in *G. effusa*), flowers 8–12 mm long (12–16 mm long in

G. effusa), and pedicels 4–10(–15) mm long (8–35 mm long in *G. effusa*). The two species have widely disjunct recorded distributions and *G. virgata* is not known to occur in Queensland (occurring in Western Australia and the Northern Territory).

Goodenia armitiana and *G. triodiophila* have overlapping distributions and habitat with *G. effusa*, and are easily confused in the field. Both *G. armitiana* and *G. triodiophila* can be distinguished from *G. effusa* by the differently shaped wings on the corolla lobes, these tapered to the apex of the lobe and not extending beyond as is the case for *G. effusa*. *Goodenia armitiana* is also distinguished from the other three species by the viscid stems and leaves, and *G. triodiophila* by the wider indusium (2.5–3 mm) and fruit (6–8 mm). In the herbarium, *G. effusa* is readily distinguished from *G. armitiana* and *G. triodiophila* by drying black.

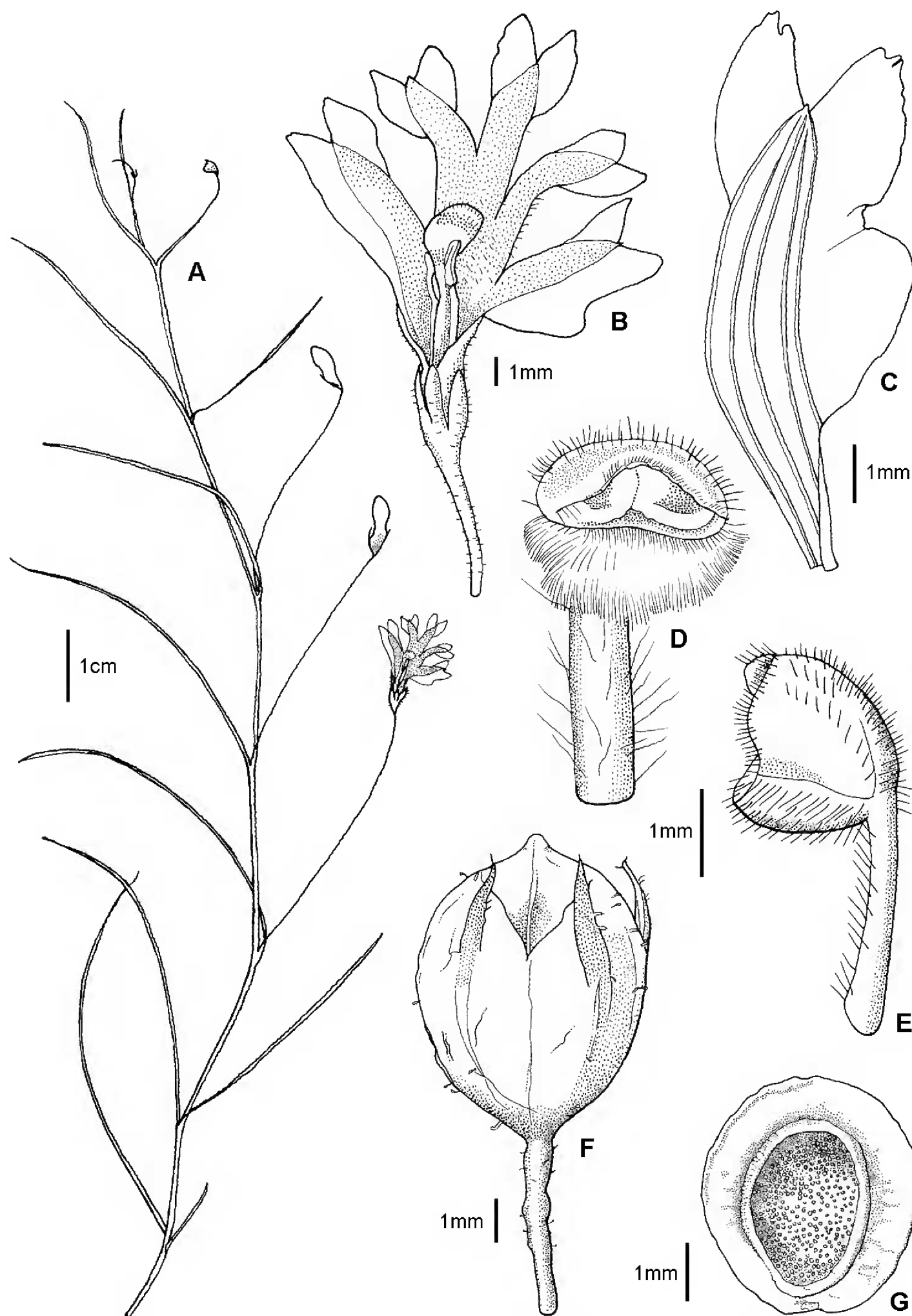


Fig. 1. Illustration of *Goodenia effusa*: **A**, habit; **B**, mature flower (partly dissected), showing pedicel, calyx, corolla and indusium; **C**, adaxial corolla lobe with auricle; **D,E**, indusium (lateral view); **F**, fruit, in situ, showing pedicel and capsule extending beyond calyx; **G**, seed. **a** from McDonald 6184 (BRI); **b,c,d,e** from McDonald 5582 (BRI); **f,g** from McDonald 2247 (BRI). Illustration: Will Smith.



Fig. 2. *Goodenia effusa* early flower with corolla lobe auricles overlapping and hiding the indusium. The corolla lobe wings have obtuse apices in this specimen (photograph: Keith McDonald – *McDonald 115500*).

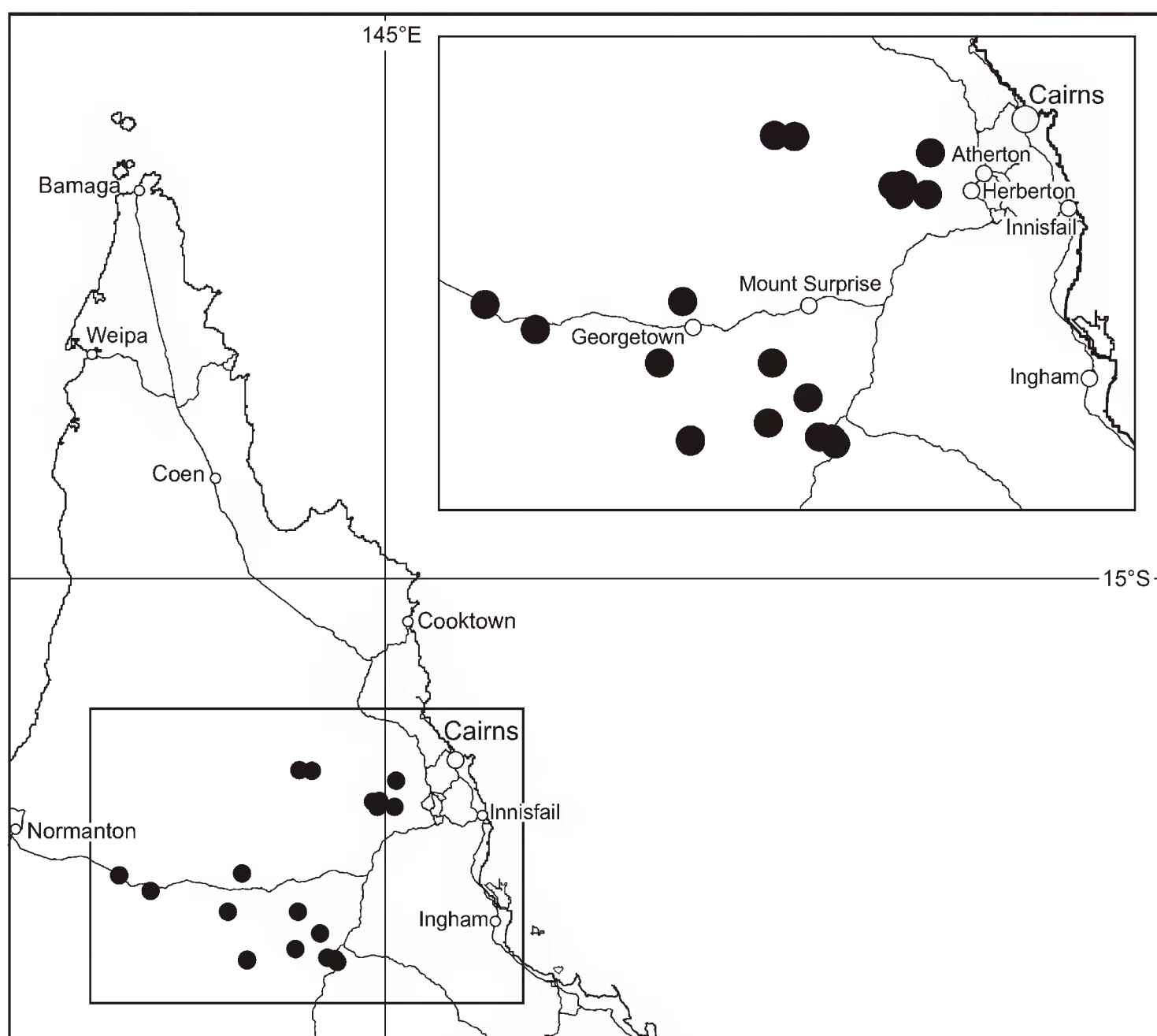


Fig. 3. Distribution of *Goodenia effusa* in northern Queensland, Australia, with highways (grey lines); insert map (upper right) detail showing distribution between Cairns and Croydon.

A key to the species of *Goodenia* in Queensland is available on KeyBase (2015).

Notes: An examination of the holotype of *G. virgata* (NSW106414) (images available at <http://plants.jstor.org>) and 16 other specimens of *G. virgata* from central Australia (all of the available material at NT) has revealed that *G. virgata* has pedicels 4–10(–15) mm long, shorter than the 15–25 mm described by Carolin (1992). The cauline leaves were also shorter on the observed specimens, with none longer than 4 cm. The prominent ‘pulvinus’ described by Carolin (1992) is indistinguishable from that of related species, at least when dry, and is therefore is not regarded as a useful taxonomic character.

This taxon is here given species status, as there are no apparent intermediates with the most morphologically similar species, *G. virgata*, and the two distributions are widely separated (AVH 2015). However, molecular phylogenetic research is needed to further resolve the relationships in the group.

Table 1. Summary of diagnostic characters for *Goodenia effusa* and morphologically similar *Goodenia* species.

Note: measurements by the author agreed with those given by Carolin (1980; 1992), except those marked (*) (see notes above for explanation).

Morphological characters	<i>G. effusa</i>	<i>G. virgata</i>	<i>G. armitiana</i>	<i>G. triodiophila</i>
Drying colour	drying black	drying black	drying green	drying green
Stems	not viscid	not viscid	viscid	not viscid
Leaf length	1–7 cm	0.4–4 cm*	3–6 cm	4–10 cm
Lower leaf shape	terete	flat	terete	terete
Lower leaf width	0.3–0.5 (–1) mm diam.	1–4 mm wide	0.5–1.5 mm diam	c. 1 mm diam
Leaf hair	None	sparse or none	few scattered	few scattered
Pedicel length	8–35 mm	4–10 (–15) mm*	20–40 mm	8–30 mm
Corolla length	12–16 mm	8–12 mm	8–10 mm	10–12 mm
Adaxial corolla lobe wing shape	extending well beyond lobe apex, forming an acute angle at lobe apex	extending well beyond lobe apex, forming an acute angle at lobe apex	tapered to lobe apex forming an obtuse angle at apex.	Tapered to lobe apex forming an obtuse angle at lobe apex.
Indusium width	1.5–2 mm	1.5–2 mm	1.5–2 mm	2.5–3 mm
Fruit width	3.5–6 mm	5–7 mm	4–6 mm	6–8 mm

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